bias when it is considered that at least fourteen out of the twenty-three members who voted for the 'proposed agreement' are alumni of, or are otherwise closely affiliated with, Harvard University, and that three out of the four conferees who drew up the agreement are officially connected with that university? Is it maintained that devotion to the institute blinds the faculty (nearly half made up of men who are not technology graduates), while zeal for Harvard does not blind members of the corporation to the true interests of the institute and of education?

The alumni vote was disregarded, it has been stated, because it was not more complete. That it was not larger is due, in great part, to the fact that, pressed on the one hand by the need of waiting for the opinion of the faculty, and, on the other, by the request of the corporation that the vote be in not later than June 1, the executive committee could give the alumni only ten days in which to receive and digest the great mass of argument sent to them, and to get their ballots into the hands of the committee. Most of the members of the corporation, however, have long been associated with many large voting bodies and must be fully aware, not only of the difficulty of securing a full vote from a widely scattered body of three thousand busy men, but also of the general experience that the ratio of voting, after the first few hundred ballots come in, remains almost constant, and that, therefore, had every alumnus registered his opinion, the final proportion (three opposed to one in favor of the plan) would have been almost exactly the same.[2]

Taking into consideration, therefore, the three coordinate bodies which, in equity if not in law, govern the Institute of Technology, the registered vote upon the 'proposed agreement' stands, numerically, 1,422 against the plan to 488 in its favor; and the vote by percentages is as follows:

	Against the Agreement.	For the Agreement.
Corporation	40 per cent.	60 per cent.
Faculty	89 per cent.	11 per cent.
Graduates	75 per cent.	25 per cent.

If the plan is presented to Harvard, therefore, it goes with the indorsement of only one fourth of the men in those three bodies which have made the institute what it is and upon which the school must depend for future strength and usefulness. Is it likely, then, that there can be a genuine and hearty 'combination of effort' with Harvard University, especially in view of the well-known opposition to the alliance of practically all the Lawrence Scientific School faculty and alumni, of many, if not most of the academic faculty of Harvard, and of the close friends, including the chairman of the trustees, of Mr. McKay? A partnership between Harvard and the institute to which substantially all the parties in interest consented might be practicable; but one like this, which is repugnant to most of those whose good will and enthusiastic efforts are essential, must inevitably result, if attempt is made to force it through, not only in the wrecking of the institute, but also in the controlling of education by purely business standards. To use the methods of industrial trusts in conducting colleges and universities is to threaten the present efficiency and ultimately the life of all higher education.

[2] Significant in this connection are the votes of the last two classes, who are most intimate with the institute as it is, and who have been directly under the influence of the alliance discussion. At the time of its graduation, a year ago, the class of 1904 was overwhelmingly in favor of an alliance. Their recent official votes against the 'proposed agreement,' however, was 116 to 22. No vote was requested from the class of 1905, but the poll which they took themselves stands in the ratio of 95 to 5 against the proposed alliance.

MATHEMATICS IN JAPAN.

AT the celebration of the last birthday of the emperor of Germany Professor Harzer delivered a long address on the 'Exact Sciences in Old Japan.'[1] Although Professor Harzer is an astronomer, he devoted nearly his entire address to the history of mathematics, saying that 'the little that is known of Japanese astronomy does not awaken any hope of any achievements worth mentioning

[1] *Jahresbericht der Deutschen Mathematiker-Vereinigung*, Vol. 14, 1905, pp. 312–339.

along this line.' Even in mathematics too little of the available material has been critically examined to make it possible to write a complete and trustworthy history, but the sudden prominence of Japanese activity and power gives unusual interest to any facts relating to the thought and scientific development of this country.

The 2,000 mathematical works in the royal library of Tokio, some of which date back to 1595, are a sufficient guarantee of high esteem for mathematical knowledge. As the Japanese mind is very practical and shows little aptitude for the abstract and philosophical, it is to be expected that their mathematical achievements are in very close touch with practical problems and are foreign to those fields of mathematics which border on philosophy. The determination of the area of the circle in terms of its diameter is one of the most important of these practical problems and the Japanese took especial interest in developments which were useful to obtain an approximate solution of this problem.

Such a solution is equivalent to an approximate determination of the ratio between the diameter and the circumference of a circle. This ratio, known as the Ludolphian number, plays such a prominent rôle in the development of mathematics that so eminent a mathematician as Glaisher has remarked that its history is almost identical with the history of mathematics. The approximate value of this number can be most readily obtained by infinite series, and this is the method which the Japanese employed as early as the seventeenth century. In doing this they used the binomial theorem for fractional exponents as early if not earlier than Newton did. One of the proudest triumphs of this master mind was, therefore, achieved independently by the race whose recent marvelous progress has been attracting universal attention.

One of the other prominent discoveries of Newton, viz., the infinitesimal calculus, seems also to have been discovered independently by the Japanese, although the evidence on this point is not conclusive. It is, however, certain that the Japanese were not far behind the Europeans in their mathematical attainments during the latter part of the seventeenth century. Since then they have not made the rapid progress which Europe has witnessed as a result of the work of Euler, Lagrange, Cauchy and Gauss. They did not have any such leaders, and hence their advanced mathematics was practically neglected.

Within recent years there has been a great advance in mathematical instruction. A large number of students are debarred from the upper classes of the higher institutions on account of their lack in mathematical training. There seems to be a very widespread feeling that the educational system is mostly in need of improvement along the line of mathematical instruction and the efforts towards progress along this line exhibit Japanese vigor and courage. It will probably require a number of years before much will be accomplished in higher mathematics.

The most surprising fact about Japanese mathematics is that, while the most elementary parts were regarded as common property, the more advanced results were regarded as secrets which should be communicated to a very few. In fact, an oath of secrecy was required of those who wished to hear lectures on advanced mathematics. European history furnishes a parallel to this in the Pythagorean school, but it is so totally different from the modern spirit that its existence 2,000 years after Pythagoras was unexpected. Fortunately all this has recently changed to such an extent that a history of Japanese mathematics could be published a few years ago. A small part of this has been translated into English.[2]

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Proposed Magnetic and Allied Observations during the Total Solar Eclipse, August 30, 1905.

In response to my appeal for simultaneous magnetic and allied observations during the coming total solar eclipse, cooperative work

[2] Tsuruichi Hayashi, 'A Brief History of the Japanese Mathematics,' *Nieuw Archief voor wiskunde*, 1904, pp. 296–324; 1905, pp. 325–361.